HW4

clarissa

July 31, 2014

Contents

1 HW 4: Computable Reductions

1.1 Problem 1

Show that the language ALL_{TM}, defined as $\{M|$ where M is a TM and $L(M) = \Sigma^*\}$, is undecidable.

1.2 Problem 2

A **useless state** in a Turing machine is defined as a state that is never entered by the machine on any input. Consider the problem of detecting if a Turing machine has a useless state. Formulate this problem *as a language* and show that the language is undecidable.

1.3 Problem 3

If $A \leq_m B$ and B is a regular language, is A necessarily a regular language? Justify your answer.

1.4 Problem 4

Let B be a decidable language with $B \neq \emptyset$ and $B \neq \Sigma^8$, then if A is decidable define a computational reduction $A \leq_m B$.